belong in the third category "Diamond Single Layer Products" or the first category "Diamond Bonded Products."

Under items 20 and 31 of the Manual, the general shape and location of the abrasive within Applicants' tools may be seen in the "Straight Wheel Type 1A1" illustration, wherein the abrasive is located on the "Periphery" of the wheel. In contrast, the Holzapfel wheel (see Holzapfel Fig. 9) and some embodiments of the Goers wheel (See Goers Fig. 6-7) may be seen in the item 31 "6A2C" drawing of abrasive on the "Side" of the core. The Goers wheel embodiments shown in Figures 1-5 of the Goers patent do not appear in the Appendix A excerpt from the Manual, but do share with the 6A2C type wheel the characteristic that the abrasive is located on the side of the core or disk. The location of the abrasive determines which face of the tool to use for grinding or polishing and, thus, whether the tool may be used for high contact area surface grinding (abrasive on the side of the wheel or disk) or for low contact area outer diameter, inner diameter, plunge, cylindrical or other grinding modes (abrasive on the periphery or perimeter of the wheel or disk).

The Holzapfel and Goers tools condition the surfaces of polymeric pads that are used in CMP (chemical mechanical planarization) processes to polish the surfaces of ceramic wafers for integrated circuit manufacturing. These tools cannot be used in peripheral grinding operations, or in dressing profiled grinding wheels.

Applicants "rotary profile dressing tool" that is the subject of claims 1-10 grinds the complex working surface of a grinding wheel during use to remove grinding debris and restore the complex surface of the wheel to an original, intended shape or profile so parts can continue be ground to that same precision shape or profile.

An image of a profiled grinding wheel can be seen in Appendix A on the upper half of the first page of the Norton Brochure. One can observe parallel indentations of different depths along the periphery of the wheels. When the profiled grinding wheel is operated, the mirror image of those parallel indentations is imparted to the part being ground. Samples of Applicants' claimed rotary profile dressing tool appear on the lower half of the first page of the Brochure. The images in the lower right hand corner of the Brochure show how the dressing tool is rotated against the profiled grinding face of the grinding wheel to maintain the shape during grinding.

Figure 1 of Applicants' patent application also contains a drawing of the dressing tool and a profiled grinding wheel. As noted with arrows 6 and 7 in Figure 1, the dressing tool may be moved

in an X, Y direction as it is rotated around axis 5 in order to dress all parts of the grinding wheel profile. As set forth in claim 1, the abrasive rim is "...oriented in a direction orthogonal to the axis of rotation of the tool...."

The recitation of a rotary dressing tool in the preamble of Applicants' claims is a structural limitation. See page 1, lines 1-17, pages 3-4, the Description of the Drawings, and Fig. 1. The Court of Appeals for the Federal Circuit has ruled that such structural limitations are allocated significant weight in the evaluation of patentability over the prior art. Corning Glass Works v. Sumitomo Electric, 9 USPQ2d 1962, 1966 (Fed. Cir. 1989).

One can visualize by means of the illustrations in the references, the rejected application and the submissions contained in Appendix A, that Holzapfel and Goers do not disclose Applicants' claimed invention, the invention is novel and the rejection under Section 102(e) is unfounded.

Section 103 (a) Rejection

Turning to the rejection of claims 4-7 and 9-10 under Section 103(a) over Goers or Holzapfel, alone, as set forth in the Section 102(e) remarks, above, neither reference teaches the most critical structural elements of Applicants' claims. Those elements are: "A rotary profile dressing tool...the abrasive rim being oriented in a direction orthogonal to the axis of rotation of the tool...." (See Applicants' claim 1.)

The legal standard to be applied for obviousness determinations during prosecution is set forth in MPEP 706.02(j), and it follows the decision of In re O'Farrell 7 USPQ2d 1673 (CAFC 1988). The MPEP states a *prima facie* obviousness rejection requires the presence of three elements in the prior art. First, there must be a suggestion or motive in the references or in the general knowledge in the art to modify the references or to combine the references. Second, there must be a reasonable expectation of success in making such a combination or modification. Third, the art must teach or suggest all claim limitations.

The art fails to teach or suggest a rotary profile dressing tool having an abrasive rim oriented in a direction **orthogonal** to the axis of rotation of the tool. Both Holzapfel and Goers teach CMP pad conditioning tools having an abrasive element oriented in a direction **parallel** to the

axis of rotation of the tool. Thus, the third requirement for a finding of obviousness has not been met.

Both cited references direct their teachings to the narrow scope of conditioning polymeric pads used in CMP process finishing of silicon wafers for integrated circuits. Here the technical concern has been maintaining planarity of the pad surface during and after use of the conditioning tools and avoiding loss of abrasive grits into the pads, with the consequential damage to the surface of the silicon wafer being polished from the lack of planarity or from grit loss. One skilled in the abrasives technology art would not predict that success in CMP pad conditioning would also provide a success in a rotary profile dressing tool used in dressing grinding wheel profiles, a dressing process where the loss of grit from the face of the grinding wheel is an intended consequence of the process and where the tool tip radius is critical to creating and maintaining a precise, profiled, non-planar surface on the grinding wheel. Further, neither Holzapfel nor Goers describe any tool application beyond the CMP process. Thus, the first and second requirements for a finding of obviousness have not been met.

Furthermore, Applicants preferred tool compositions and designs would never be used in the CMP processes described in Holzapfel and Goers.

Applicants' claim 6 is directed to tools made with diamond abrasive grains having an average diameter of 0.15 to 2.0 mm. Claim 7 is directed to a tool having an abrasive rim with a tip radius equal to about one-half of the average diameter of the diamond abrasive grains. Such relatively large diamond sizes and narrow contact area tip grinding surface of the claimed rotary dressing tools allow precise dressing of the grinding wheel profile, with desirable tool life properties, but would tear up a CMP pad surface.

Applicants' claim 4 is directed to a tool made with a bronze braze containing titanium as the active chemical component. Clam 5 is directed to tool made with a braze composition comprising, on a weight % basis, 55-79 % copper, 15-25 % tin and 6-20 % titanium. Thus, these preferred compositions comprise significant amounts of copper. Copper metal can be an undesirable contaminant in CMP processes and a bronze alloy braze cannot be used in such processes. Neither Holzapfel nor Goers disclose a braze of metal bond containing copper or bronze. In contrast, copper alloys are preferred embodiments of the rotary profile dressing tools of

Applicants invention because they provide a mechanically tough, abrasion resistant, superior bond for abrasive grain being used to dress the grinding face of an abrasive grinding wheel.

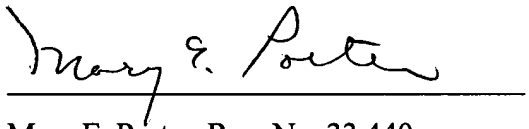
Neither reference suggests the embodiment of claims 1, 3-7 and 9-10 wherein the abrasive rim is self-supporting without a backing element, as illustrated in Figure 4. In fact, the references teach away from this embodiment as they stress the need for full retention of all abrasive grains by the conditioning tool and leave all or part of the perimeter of the supporting core free of abrasive grain to give added support to the abrasives grain that is bonded to inner portions of the core.

For all of these reasons, claims 4-7 and 9-10 are not obvious over the teachings of the cited references.

CONCLUSIONS

In view of these remarks, Applicants respectfully request an allowance of claims 1-10.

Respectfully submitted,



Mary E. Porter, Reg. No. 33,440
Attorney for Applicant
Phone No. 508-795-2555
Fax No. 508-795-2653

September 15, 2005
Norton Company/
Saint-Gobain Abrasives, Inc.
One New Bond Street
Number 15138
Worcester, MA 01615
#30249.06